Small Business Innovation Research/Small Business Tech Transfer

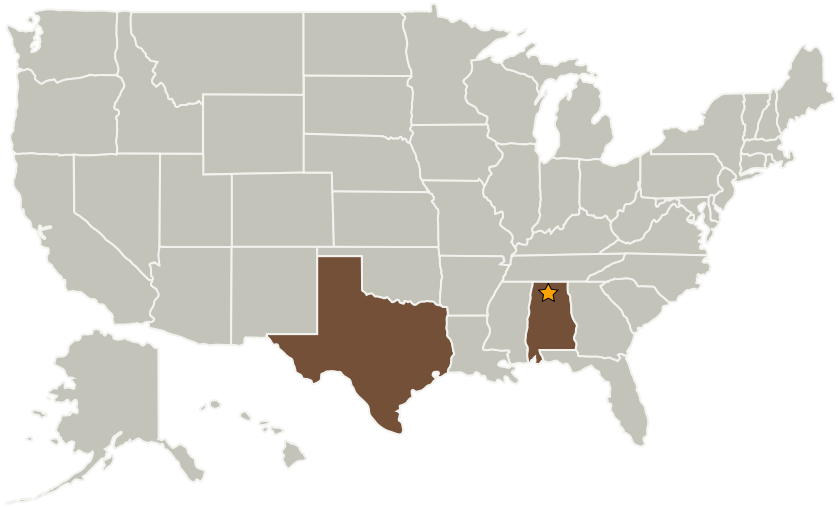
Laser Power Transmission Employing a Dual-Use Photovoltaic Concentrator at the Receiving End, Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

The proposed innovation is a wireless laser power transmission system employing a dual-use photovoltaic concentrator at the receiving end. Specifically, the laser receiver/converter employs thin Fresnel lenses to focus continuous or pulsed laser light onto small photovoltaic cells, thereby reducing cell cost and improving cell conversion efficiency (> 70% near term). The dual-use approach employs a novel four-terminal multijunction cell interconnection design to allow the same photovoltaic concentrator to be used as a state-of-the-art solar array. Specifically, the photovoltaic concentrator uses multijunction cells for the high-efficiency solar radiation conversion (> 30% near-term), but only the top junction of such cells for the high-efficiency laser radiation conversion. After system optimization in Phase I and system demonstration in Phase II, the new modular laser/solar photovoltaic concentrator will have many NASA, military, and commercial space applications. Applications include spacecraft arrays receiving laser input from other spacecraft or from Earth; lunar or planetary arrays receiving laser input from nearby spacecraft or from Earth; and Earth-based arrays receiving laser input from space solar power (SSP) spacecraft. The dual-use capability enables state-of-the-art solar power operation when sunlight is available (e.g., illuminated orbit portion), and laser operation when sunlight is not available (e.g., eclipse orbit portion).

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
ENTECH, Inc.	Supporting Organization	Industry	Keller, Texas

Primary U.S. Work Locations	
Alabama	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Mark O'neill

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic